TM 11-5815-245-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

34

OPERATION AND ORGANIZATIONAL MAINTENANCE SIGNAL DATA CONVERTER CV-395/U (TUNING INDICATOR)

HEADQUARTERS, DEPARTMENT OF THE ARMY
AUGUST 1959

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the plate and power-supply circuits, or on the 115-volt ac line connections. Serious injury or death may result from contact with these circuits or connections.

DON'T TAKE CHANCES!

Selenium rectifiers are used in this equipment. When these rectifiers fail, because of burnout or arc-over, poisonous fumes and compounds are released. The fumes have a strong odor. They should not be inhaled.

PROVIDE ADEQUATE VENTILATION IMMEDIATELY AND DO NOT HANDLE THE RECTIFIER UNTIL IT HAS COOLED

TECHNICAL MANUAL
No. 11-5815-245-12

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON 25, D. C., *18 August 1959*

SIGNAL DATA CONVERTER CV-395/U (TUNING INDICATOR)

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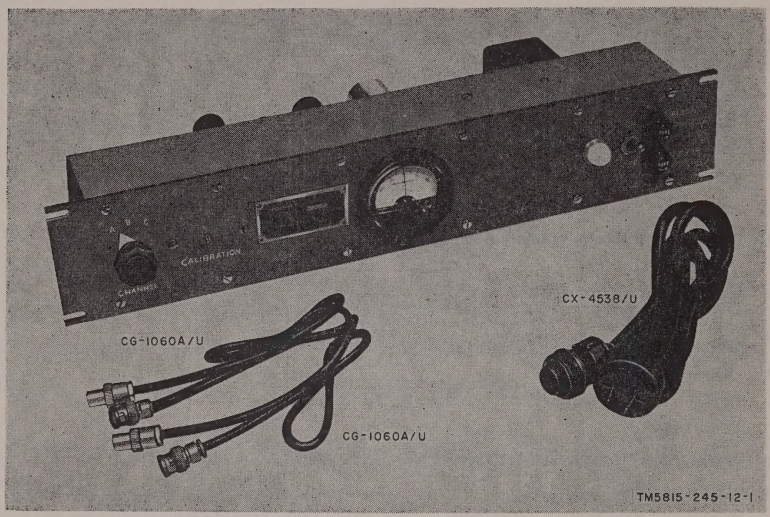

Figure 1. Signal data converter CV–395/U.

CHAPTER 1
INTRODUCTION

Section I. GENERAL

1. Scope

This manual describes Signal Data Converter CV–395/U (fig. 1) and contains information necessary for its installation, operation, and organizational maintenance. It covers inspection and cleaning of the equipment and replacement of parts available to first and second echelon maintenance.

2. Forms and Records

a. Unsatisfactory Equipment Reports.

(1) Fill out and forward DA Form 468, (Unsatisfactory Equipment Report), to the Commanding Officer, U. S. Army Signal Equipment Support Agency, Fort Monmouth, N. J., as prescribed in AR 700–38.

(2) Fill out and forward AF TO Form 29, (Unsatisactory Report), to the Commander, Air Materiel Command, Wright-Patterson Air Force Base, Ohio, as prescribed in AF TO 00–35D–54.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700–58.

c. Preventive Maintenance Form. Prepare DA Form 11–238 (Maintenance Check List for Signal Equipment (Sound Equipment, Radio, Direction Finding, Radar, Carrier, Radiosonde and Television)), in accordance with instructions on the form. Refer to TM 11–264B, Radio Set AN/GRC–26D.

d. Comments on Manual. Forward all comments on this manual directly to the Commanding Officer, U. S. Signal Publications Agency, Fort Monmouth, N. J. Comments concerning omissions and discrepancies in the maintenance allocation chart will be prepared on DA Form 2028 and forwarded direct to Commanding Officer, U. S. Army Signal Equipment Agency, Fort Monmouth, N. J., ATTN: SIGFM/ES–M.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Signal Data Converter CV–395/U provides a visual indication of correct tuning of Frequency Shift Converter CV–116/URR and associated Radio Receivers R–390/URR for reception of time division multiplex frequency shift radioteletype (rtt) signals. A CHANNEL switch permits the tuning and monitoring of the output of either A or B receiving channel of the associated frequency shift (fs) converter.

b. The signal data converter is designed for use in fixed or mobile rtt communication centers and is usually mounted on the equipment rack with the associated converter and radio receivers.

4. Technical Characteristics

Input impedence	1 megohm.
Type of input signals	Positive (mark) and negative (space) square-wave voltage pulses.
Type of indication	Visual (zero reading on meter indicates correct tuning).
Signal freqnency	100 dot cycles per second max.
Number of channels	3 (2 receiving, 1 calibration).
Number of tubes	3.
Number of selenium rectifiers	1.
Power source	115 v ac, 50–60 cycles single phase.
Power consumption	25 watts.
Weight	7 pounds.

5. Table of Components

a. Components. The components of the signal data converter are listed in the following table:

Quantity	Item	Length	Height (in.)	Depth (in.)	Weight (lb)
1	Signal Data Converter CV–395/U (tuning indicator)	19 in.	3½	6½	7.5
1	Electrical Power Cable Assembly CX–2491/U	6 ft			.5
2	RF Cable Assembly CG–1060/U	2 ft			.2
1 set	Running spares				

b. Running Spares. The following running spares are supplied:

Quantity	Item
1 each	Electron tube 5726/6AL5W.
1 each	Electron tube 5814A.
5 each	Fuse 3AG, .25 amp.
1 each	Lamp 6–8 v miniature bayonet base.

6. Nomenclature and Common Name

a. A list of the nomenclature assignments for the components of Signal Data Converter CV–395/U is given below. A common name is indicated after each item.

Nomenclature	Common name
Signal Data Converter CV–395/U	Tuning indicator or signal data converter.
Electrical Power Cable Assembly CX2491/U.	Power cable.
RF Cable Assembly CG–1060/U	Input cable.

b. Frequency Shift Converter CV–116/URR is referred to as the fs converter throughout this text.

7. Description

a. The tuning indicator (fig. 1) is self-contained and designed for rack mounting. It is 19 inches long, 3½ inches high, and 5¾ inches deep. The panel and chassis are made of aluminum alloy.

b. All operating controls and indicators are on the front panel. The power signal input connectors are located on the rear of the chassis.

CHAPTER 2

INSTALLATION AND OPERATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

8. Unpacking

a. Packaging Data. When packed for shipment, the cushioned tuning indicator and its accessories are placed in a water-resistant carton and packed in a wooden box.

b. Removing Contents. Perform all the steps outlined below when unpacking equipment contained in wooden boxes. When unpacking equipment contained in cartons, omit the procedures given in (1) through (3) below:

(1) Cut and fold back the metal straps.

(2) Remove the nails from the top of the box with a nail puller. Remove the top. Do not attempt to pry off the top because the equipment may become damaged.

(3) Remove the water-resistant carton from the box.

(4) Open the carton and remove the contents.

9. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, refer to paragraph 2*b*.

b. See that the equipment is complete as listed on the packing slip. If a packing slip is not available, check it against the table of components (par. 5).

c. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If modified, the MWO number will appear on the front panel near the nomenclature plate. Check to see that this MWO number also appears on the schematic diagram of the manual accompanying the equipment. If not, add a note to the over-all schematic diagram.

10. Installation

a. The tuning indicator is shipped with all tubes and fuses installed.

b. Install the tuning indicator as follows:

(1) Place the tuning indicator on the rack in accordance with the instructions for the vehicle in which it is to be installed. Since the connecting cables between the tuning indicator and the fs converter are 2 feet long, locate the tuning indicator adjacent to the fs converter. The location must also be within 6 feet of a 115-volt, alternating current (ac) power source.

(2) Screw the tuning indicator to the rack through the front panel mounting slots.

11. Connections
(fig. 3)

a. Power Cable. Connect the power cable between the PWR IN connector and a 115-volt ac power source.

b. Input Cables. Connect one of the input cables between INPUT A connecter of the tuning indicator and OUTPUT A of the fs converter. Connect the other input cable between INPUT B connector of the tuning indicator and OUTPUT B of the fs converter.

Section II. OPERATING INSTRUCTIONS

12. Controls and Indicators (fig. 2)

The following chart lists the controls and instruments and describes their functions:

Control or indicator	Function
ON-OFF switch	Connects tuning indicator to ac power source.
CHANNEL selector switch	In A position, channel A input is monitored. In B position, channel B input is monitored. In C position, connects to internal calibration circuit.
CALIBRATION (screwdriver control)	Used only with channel selector switch in position C. Compensates for variations in electron tubes and other components, electrically zeroes microammeter M1.
Microammeter M1	When used in conjunction with the CHANNEL selector switch, indicates correct calibration and correct tuning of keyed signals.

13. Operation

a. Place the tuning indicator in operation as follows:

(1) Check cable connections as outlined in paragraph 11.

(2) Set the ON-OFF switch to ON. Note that the pilot lamp lights. Allow the equipment to warm up.

(3) Rotate the CHANNEL selector switch to C position. Adjust the CALIBRATION control for a zero reading on the milliammeter. (The milliammeter does not respond instantaneously to changes of the CALIBRATION control.) Observe the meter for a few seconds; readjust to zero if necessary.

(4) Rotate the CHANNEL selector switch to B position. Tune the associated radio receiver for zero indication on the meter with keyed signals received.

(5) Rotate the CHANNEL switch to A position. Tune the associated radio receiver for zero indication on the meter with keyed signals received.

Note. Adjust the fs converter in accordance with the instructions given in TM 11–2241, Frequency Shift Converter CV–116/URR.

b. The tuning indicator shows when received signals are correctly tuned with respect to the fs converter discriminators center frequencies. This feature permits correct tuning of frequency shift signals irrespective of the number of channels in use. Similarly, the tuning indicator will indicate when the received signals are detuned to a point approaching the limits of performance of the fs converter.

c. With mark or space signals of extended duration, the meter will show a deflection to the right or left of zero. The amount of deflection will depend on the input signal voltage to the tuning indicator. For signals having a frequency shift of 850 cycles, the meter deflection is approximately half scale to the right for mark signals and half scale to the left for space signals. Several seconds are required for the meter to reach a steady state when switching from a prolonged mark to a prolonged space or vice-versa.

d. The limit of performance of the converter is reached when the received signal is detuned to a frequency which results in a discriminator output voltage of either:

(1) Zero volts mark, —24 volts space. (Under this condition, the tuning indicator will read approximately 40 to the left of zero.)

(2) Twenty-four volts mark, 0 volts space. (Under this condition the tuning indicator meter will read approximately 40 to the right of zero.)

e. When using AFC with the associated fs converter, the SHIFT ADJUSTMENT control should be set at a point which will result in zero reading on the tuning indicator meter when keyed signals are received.

f. To remove the tuning indicator from service, set the ON-OFF switch to OFF.

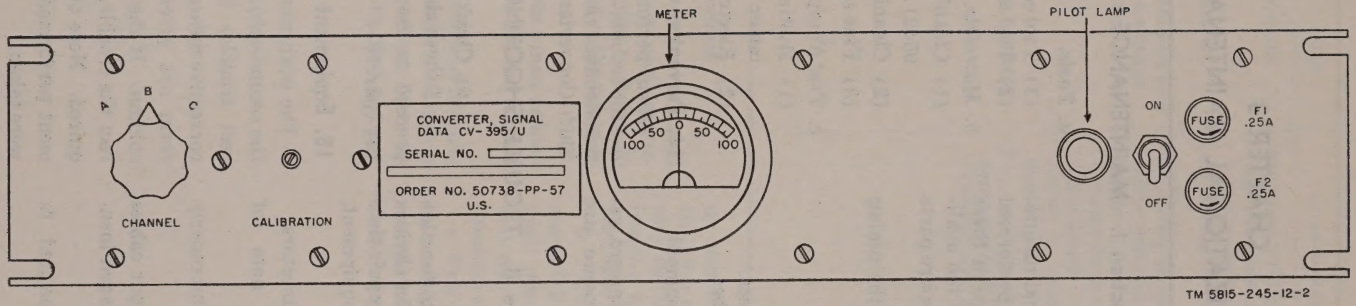

Figure 2. Signal Data Converter CV–395/U, controls and indicator.

CHAPTER 3
ORGANIZATIONAL MAINTENANCE

Section I. MAINTENANCE

14. Scope

a. This section covers organizational maintenance and explains the duties to be performed by maintenance personnel. The scope of these instructions has been determined by the available tools, materials, test equipment, spare parts and the MOS of the repairman.

b. Organizational maintenance of the tuning indicator consists of the following:

(1) Preventive maintenance.
(2) Visual inspection.
(3) Trouble shooting.
(4) Replacement of defective fuses.
(5) Replacement of defective tubes.

15. Tools, Materials, and Test Equipment Required

The tools, materials, and test equipment required for second echelon maintenance are listed below:

a. Tools.

(1) Tool equipment TE–41.
(2) Tool equipment TE–113.

b. Materials.

(1) Cleaning Compound (FSN 7930–395–9542).
(2) Cleaning cloth.
(3) Fine sandpaper.

c. Test Equipment.

(1) Multimeter AN/URM–105 (or Multimeter TS–352/U).
(2) Electron Tube Test Set TV–7/U.

16. Preventive Maintenance

When performing preventive maintenance, use the techniques outlined in the organizational maintenance chapter of TM 11–2241, Frequency Shift Converter CV–116/URR.

Section II. TROUBLE SHOOTING

17. Visual Inspection

a. When the tuning indicator fails to function properly, turn off the power and look for obvious defects. Visual inspection may save repair time and avoid further damage to the equipment. Check the following items:

(1) The seating of all chassis connectors.
(2) Tightness of mounting nuts of switches and fuse holders.
(3) Check for damaged or improperly seated electron tubes.
(4) Check power and signal input cables for loose connectors or damaged insulation.
(5) Check connections to associated fs converter.
(6) Check fuses.

b. If these checks do not locate the troubles, proceed to the equipment performance check list (par. 18).

18. Equipment Performance Check List

The equipment performance check list helps the second-echelon repairman to locate and correct troubles limited to plug-in parts. All corrective measures that the repairman can perform are given in the *Corrective measures* column. If the measures indicated do not correct the trouble, repair by higher echelon is required. Note on the repair tag how the equipment performed and what corrective measures were taken.

Step	Control	Action	Normal indication	Corrective measures
1	ON-OFF switch S1.	Set to ON.	Pilot Lamp DS1 lights. Meter fluctuates as tuning indicator stabilizes.	Check power connections. Check fuses. Check pilot lamp.
2	CHANNEL switch S2.	Set to C.	Zero reading on meter.	Step 3.
3	CALIBRATION resistor R1.	Adjust for zero reading on meter.	Zero reading on meter. (Meter will read approximately —60 with control in maximum ccw position, approximately +60 with control in maximum cw position.)	If meter swing is half of normal reading on either or both sides of zero, check V1. If meter does not respond to movement of CALIBRATION control, check V2 and V3 (par. 19).
4	CHANNEL switch S2.	Set to A or B.	Zero meter reading when associated fs converter is receiving keyed signals.	Check input cables and connections. Disconnect cable at output A or B of associated fs converter. With multimeter on low ohms scale, touch leads to center and outer conductors of connector. M1 will read approximately 10 divisions to one side of center. Reverse multimeter leads and repeat for same reading on opposite side of center. Check tubes.

19. Tube Testing and Replacement

If the equipment fails to perform as indicated on the check list, check all cables and connections before removing any tubes. Refer to figure 3 for location and identity of the tubes of the tuning indicator.

Caution: **Do not rotate a tube when removing it from a socket; pull it straight out with a tube puller.**

a. Use of Tube Tester. Remove and test one tube at a time. Discard a tube only if its defect is obvious or if the tube tester shows it to be defective. Do not discard a tube that tests at or near its minimum test limit unless the substitution of a new tube corrects the unsatisfactory condition. Put back the original tube or insert a new one if required before testing the next one.

b. Tube Substitution Method. Replace a suspected tube with a new one. If the equipment remains inoperative, remove the new tube and put back the original tube. Repeat this procedure until the defective tube is located.

c. Preferred-type Tubes. The tubes used in this equipment are prefererd tube types. Do not substitute nonpreferred tube types for preferred types when replacing tubes.

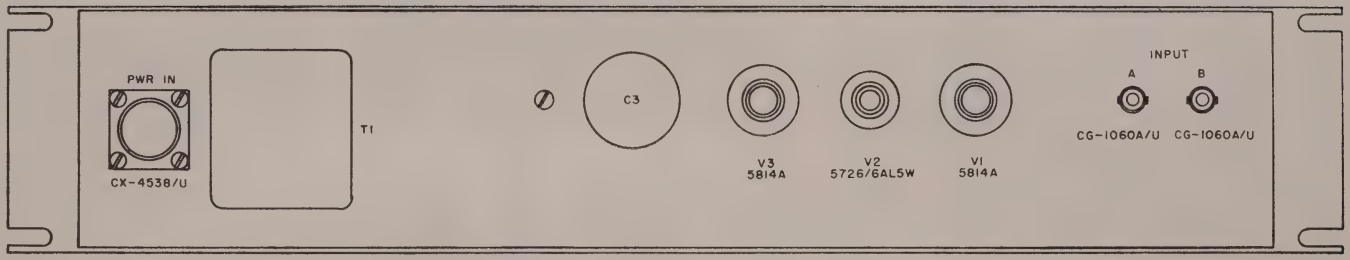

Figure 3. Signal Data Converter CV-395/U, rear view of chasis, showing tube locations.

CHAPTER 4
SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

20. Disassembly of Equipment

a. To disassemble the tuning indicator, proceed as follows:

(1) Disconnect both ends of the power cable.

(2) Disconnect both ends of each input cable. If tuning indicator is to be removed from the rack, remove the four screws through the mounting slots at the ends of the panel.

b. Instructions for repackaging for shipment or limited storage are contained in TM 11–264B.

21. Authority for Demolition

Demolition of the equipment will be accomplished only upon the order of the commander. The destruction procedure outlined in paragraph 22 will be used to prevent further use of the equipment.

22. Methods of Destruction

a. Smash. Smash the meter, controls, tubes, transformers, and connectors; use sledges, axes, handaxes, pickaxes, hammers, crowbars or heavy tools.

b. Cut. Cut all cables; use axes, handaxes, or machetes.

c. Burn. Burn cords and technical manuals; use gasoline, kerosene, oil, flame throwers, or incendiary grenades

d. Bend. Bend panel and chassis.

e. Explosives. If explosives are necessary, use firearms, grenades or TNT.

f. Dispose. Bury or scatter the destroyed parts in slit trenches, fox holes, or throw them in streams.

APPENDIX I
MAINTENANCE ALLOCATION CHART FOR SIGNAL DATA CONVERTER CV–395/U

1. General

a. The maintenance allocation chart assigns maintenance functions and repair operations to be performed by the lowest appropriate maintenance echelon.

b. Columns in the maintenance allocation chart are defined as follows:

(1) *Part or component.* Only the nomenclature or standard item name is shown in this column. Additional descriptive data are included only where clarification is necessary to identify the part. Components and parts comprising a major end item are listed alphabetically.

(2) *Related Operation.* This column indicates the various maintenance functions allocated to the echelon capable of performing the operation. These are defined as follows:

(*a*) *Service.* To clean, to preserve, and to replenish fuel and lubricants.

(*b*) *Adjust.* To regulate periodically to prevent malfunction.

(*c*) *Inspect.* To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(*d*) *Replace.* To substitute serviceable assemblies, sub-assemblies, and parts for unserviceable components.

(*e*) *Repair.* To restore to a serviceable condition by replacing unserviceable parts or by any other action required utilizing tools equipment, and skills available, to include welding, grinding, riveting, straightening, and adjusting.

(*f*) *Rebuild.* To restore to a condition comparable to new by disassembling the item to determine the condition of its component parts and reassembling it using serviceable, rebuilt, or new assemblies, subassemblies, and parts.

(3) *1st, 2d, 3d, 4th, and 5th echelon.* The symbol X indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon marked by X are authorized to perform the indicated operation.

(4) *Repair facilities code.* This column indicates codes assigned to each individual tool equipment, test equipment, and maintenance equipment listed in the allocation of tools for maintenance functions. The grouping of codes in this column indicates the tool, test, and maintenance equipment required to perform the maintenance function.

(5) *Remarks.* Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding columns.

c. Columns in the allocation of tools for maintenance functions are defined as follows:

(1) *Facilities required for maintenance operations.* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *1st, 2d, 3d, 4th, and 5th echelon.* A dagger (†) symbol indicates the echelons allocated the facility.

(3) *Repair facilities code.* This column lists the tool code assigned.

(4) *Remarks.* Not used.

2. Maintenance by Using Organizations

When this equipment is used by signal service organizations organic to theater headquarters

or communication zones to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

3. Mounting Hardware

The basic entries of this Maintenance Allocation Chart do not include mounting hardware such as screws, nuts, bolts, washers, brackets, clamps, etc.

(1) PART OR COMPONENT	(2) RELATED OPERATION	(3) 1st ECH	(4) 2nd ECH	(5) 3rd ECH	(6) 4th ECH	(7) 5th ECH	(8) REPAIR FACILITIES CODE	(9) REMARKS
CONVERTER, SIGNAL DATA CV-395/U								
	replace		X					
	repair			X				
	rebuild					X		
	service	X						Preventive Maintenance
	adjust	X						Preventive Maintenance
	inspect	X						Preventive Maintenance
CABLE ASSEMBLY, POWER CX-2491	replace		X				3	
	repair			X			1,4	
ADAPTER, CABLE, CLAMP	replace		X				3	
CABLE, 2 CONDUCTOR	replace			X			4	
CONNECTOR, ELECTRICAL	replace			X			1,4	
CABLE, RF, CO-AXIAL	replace			X			4	
CONNECTOR, CABLE JACK	replace			X			1,4	
CAPACITOR, ELECTROLYTIC	replace			X			1,4	
CAPACITOR, PAPER	replace			X			1,4	
ELECTRON TUBE	replace		X				2	
FUSE, CARTRIDGE	replace		X					
FUSE, HOLDER	replace			X			4	
KNOB	replace			X			4	
LAMP, INCANDESCENT	replace		X					
LAMPHOLDER	replace			X			4	
METER, MICROAMPERE	replace			X			4	
RECTIFIER, SELENIUM	replace			X			1,4	
RESISTOR, FIXED COMPOSITION	replace			X			1,4	
RESISTOR, VARIABLE	replace			X			1,4	
SHIELD, ELECTRON TUBE	replace		X					
SOCKET, ELECTRON TUBE	replace			X			1,4	
SWITCH, ROTARY	replace			X			1,4	
SWITCH, TOGGLE	replace			X			1,4	
TRANSFORMER, POWER, STEP-UP AND STEP-DOWN	replace			X			1,4	

(1) FACILITIES REQUIRED FOR MAINTENANCE OPERATIONS	(2) 1st ECH	(3) 2nd ECH	(4) 3rd ECH	(5) 4th ECH	(6) 5th ECH	(7) REPAIR FACILITIES CODE	(8) REMARKS
CV-395/U (continued)							
MULTIMETER AN/URM-105		†	†	†	†	1	
TEST SET, ELECTRON TUBE TV-7( )/U		†	†	†		2	
TOOL EQUIPMENT TE-41		†				3	
TOOL EQUIPMENT TE-113			†	†	†	4	

[AG 413.44 (31 July 59)]

By Order of *Wilber M. Brucker*, Secretary of the Army:

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Sig Dep (17)
Army Pictorial Cen (2)
Engr Maint Cen (1)
USA Ord Msl Comd (3)
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USA Sig Pub Agcy (8)
USA Sig Engr Agcy (1)
USA Comm Agcy (2)
USA Sig Eqp Spt Agcy (7)
USA Sig Msl Spt Agcy (13)
WRAMC (1)
AFIP (1)
AMS (1)
Ports of Emb (OS) (2)
Trans Terminal Comd (1)
Army Terminals (1)
OS Sup Agcy (1)
Yuma Test Sta (2)
USA Elct PG (1)
Sig Lab (5)
Sig Fld Maint Shops (3)
Mil Dist (1)
Sector Comd, USA Corps (Res) (1)
USA Corps, (Res) (1)
JBUSMC (2)
Units org under fol TOE:
  11-7 (2)
  11-16 (2)
  11-57 (2)
  11-98 (2)
  11-117 (2)
  11-155 (2)
  11-500 (AA-AE) (2)
  11-557 (2)
  11-587 (2)
  11-592 (2)
  11-597 (2)

NG: State AG (3).

USAR: None.

For explanation of abbreviations used, see AR 320-50.

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